Patricia Puente

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EDUCATION

PhD Applied Mathematics | Minor in Hydrology, *University of Arizona* — Expected May 2025

M.S. Applied Mathematics, *University of Arizona* — 2020

B.S. Mathematics | **Minor in Computer Science**, *Texas Woman's University* — 2019

EXPERIENCES

PhD Candidate & National Science Foundation Graduate Research Fellow — 2021 – Present
University of Arizona | Program in Applied Mathematics
Advisor: Dr. Laura Condon

- Developed models and applied advanced statistical and data methods to analyze the impact of drought on surface water in the arid southwest covering 246,000 square miles.
- Developed and implemented a Python and QGIS workflow for geospatial data processing of global surface water remote sensing data in the US to quantify changes in inundated areas over 35 years.
- Ensured data integrity and quality by pre-processing large datasets from remote sensing and historical records for accurate water resource analysis.
- Led a team of 3 researchers across 2 institutions, resulting in a peer-reviewed publication on using signal processing and nonlinear analysis in R to identify patterns in streamflow time series, improving drought insights and could be applied to regional water resource management strategies.

R&D Data Scientist Intern — 2022
Transcend Engineering | Bethel, Vermont

- Optimized and tuned LSTM machine learning models to enhance the accuracy of soil moisture predictions, improving irrigation decision-making.
- Proficient in machine learning libraries (e.g.,TensorFlow, PyTorch, scikit-learn) for building and optimizing predictive models.
- Collaborated with software engineers to identify and address causes for performance degradation during a 3-week onboarding transition, resolving 2 critical issues.
- Developed a custom pre-training data function to extract specific 24-hour periods from synthetic soil flux data, reducing data preparation time by 30% and increasing the accuracy of irrigation scheduling.

Undergraduate Researcher — 2018
James Madison University | Department of Mathematics & Statistics
Advisor: Dr. Hala Nelson & Dr. John Webb

- Developed a two-dimensional mathematical model for steak cooking in MATLAB, incorporating Flory-Rehner theory to accurately capture meat as a poro-elastic material.
- Model captured moisture swelling and surface drying during cooking, consistent with empirical data.
- Communicated results in a peer-reviewed publication and conference presentation

Undergraduate Researcher — 2017
Arizona State University | Mathematical and Theoretical Biology Institute
Advisor: Dr. Karen Rios-Soto

- Created a novel mathematical model to study cockroach infestation dynamics and their impact on atopic asthma, identifying 4 key parameters influencing infestation growth.
- Performed Forward Sensitivity Analysis to assess model sensitivity to key parameters and determining parameters with greatest impact on model output.
- Communicated results in a peer-reviewed publication and conference presentation

TEACHING EXPERIENCE

Private Tutor | University of Arizona 2022 – 2023
Courses: College Algebra and Calculus for Biological Systems

- Helped a 2nd year undergraduate student majoring in Biology finish College Algebra with a B+ and Calculus for Biological Systems with an A.
- Prepared material for extra practice and was available on a weekly basis.

Graduate Teaching Assistant | University of Arizona 2020 – 2021
Course: College Algebra

- Developed teaching material and led small group (~6 students) meetings weekly
- Created exam questions and graded assignments for 120 students

Tutor | Texas Woman's University 2017 – 2019
Courses: Algebra, Trigonometry, Calculus I & II, Database Management (SQL)

- Clarified problems to students and guided them through problem solving strategies
- Promoted awareness of undergraduate research experiences (REUs) to students in STEM
- Initiated and organized review sessions for small groups before major exams

PUBLICATIONS

Published in peer-reviewed journals

1. Nelson, H., S. Deyo, S. Granzier-Nakajima, **Puente P**., Tully K., and Webb J. "A mathematical model for meat cooking", European Physical Journal 135, **2020.,** https://doi.org/10.1140/epjp/s13360-020-00311-0
2. Kaur, A., Funderburk, K., Campaña, A., **Puente, P**., and Ríos-Soto, K. "A Household Model of German Cockroach Infestations and Their Effects on Symptoms of Atopic Asthma", Letters in Biomathematics 6, **2019.** https://doi.org/10.1080/23737867.2019.1685920

Manuscripts in Review

1. **Puente, P.**, Rajagopalan, B., Condon, LE. "Understanding Temporal Variability and Predictability of Streamflow Signatures in the Colorado River Basin", Journal of Hydrology

PRESENTATIONS

Oral Presentations

1. **Puente, P.** "Understanding Long-Term Changes in Surface Water During Drought in the Colorado River Basin using the Global Surface Water Dataset", *National Diversity in STEM (NDiSTEM) Conference*, 2024
2. **Puente, P.** "Quantifying Trends in Surface Water Inundation in the Colorado River Basin", *Computational Methods in Water Resources*, 2024
3. **Puente, P.** "Connections Between Low Frequency Streamflow Extremes and Nonlinear Dynamics in the Upper Colorado River Basin", *El Día del Agua y la Atmósfera* 2022
4. Sean Deyo, Shawn Granzier-Nakajima, **Puente P,** "A mathematical model for meat cooking", *Joint Mathematics Meeting (JMM)*, Baltimore, Maryland, 2019

Poster Presentations

1. **Puente, P.,** Laura E Condon, "Understandings Changes in Surface Water in the Colorado River Basin Using Remote Sensing Data", *El Día del Agua y la Atmósfera*, 2024
2. **Puente, P.**, Rajagopalan, B., Woodson, D., Condon, L.E., "Exploring the Role of Nonlinear Dynamics on Low Frequency Extreme Streamflow Events", *American Geophysical Union (AGU) Fall Meeting,* 2021
3. **Puente, P.**, Condon, L.E., Rajagopalan, B., "Identifying Patterns in Long Term Streamflow Variability and Predictability in the Upper Colorado River Basin using a Nonlinear Dynamics Approach", *American Geophysical Union (AGU) Fall Meeting,* 2020
4. **Puente, P.**, Kaur, A., Funderburk, K., Campaña, A., Ríos-Soto, K., "A household model of German cockroach infestations and their effects on symptoms of atopic asthma", *Society for Advancement of Chicanos/Hispanics and Native Americans in Science* (*SACNAS,)* 2017

Invited Talks

1. Panelist, “Looking Ahead – Math Alliance”, Georgia State University, 2024
2. Panelist, “How has SACNAS helped you in your career/education?”, Imagine Your STEM Future High School Outreach, 2024
3. Panelist, “How to engage in research?”, *Student Creative Arts and Research Symposium*, 2019
4. Panelist, “How to improve student/faculty relationships and involvement in research?”, *Consejos Colectivos: Improving STEM success at Hispanic Serving Institutions* 2018

FELLOWSHIP/SCHOLARSHIPS & AWARDS

NSF Graduate Research **Fellowship**, University of Arizona 2021 – 2024
Transfer Merit **Scholarship**, Texas Woman’s University 2016 – 2019
Touchstone Honors **Scholarship**, Texas Woman’s University 2016 – 2017
Merit **Scholarship**, St. Edward’s University 2015 – 2016
Travel Award, Modern Math Workshop; NDiSTEM Conference 2023
Travel Award, Joint Mathematics Meetings 2019
Travel Award, Latinx in the Mathematical Sciences Conference 2018
Travel Award, Field of Dreams Conference, Math Alliance 2018
Travel Award, NDiSTEM Conference 2017

HONORS

Best Oral Presentation Award, Pima County Flood Control 2022
Magna Cum Laude, Texas Women’s University 2019
Kappa Mu Epsilon (Math Honors) Award, Texas Women’s University 2019
Outstanding First-Year Mathematics Student, St. Edward’s University 2016
Dr. Jean McKemie Endowed Scholar, St. Edward’s University 2016

SERVICE

Co-President & Treasurer, Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) Chapter | University of Arizona 2023 – Present

- Managed and allocated the organization’s finances, doubling the budget within a year and enabling funding for 2 additional outreach events.
- Expanded chapter membership by 30% through targeted recruitment initiatives by fostering inclusive and diverse community.
- Organized and marketed two successful fundraisers through social media, utilizing Canva for marketing, and increasing social media engagement by 50%.

Peer Mentor, Mathematics and Statistics Mentoring Program | University of Arizona 2021 – 2022

- Mentored two first-year graduate students, through bi-weekly coffee chats, providing a safe space for discussions and conversations.
- Advised a first-generation mentee on joining external organizations to build community, enhancing their sense of belonging within the university.

Mentor Coordinator, Women in STEM Mentorship Program | University of Arizona 2019 – 2021

- Provided logistical support, such as distributing slides and notes to mentors, and led weekly check-ins with mentors addressing attendance and other challenges
- Provided a supportive environment for mentors to voice concerns, offering guidance and solutions to enhance the program’s effectiveness.

Vice President, Kappa Mu Epsilon Chapter | Texas Women’s University 2019 – 2021

- Promote exposure to research and graduate school
- Lead meetings and agenda to promote attendance to local math outreach